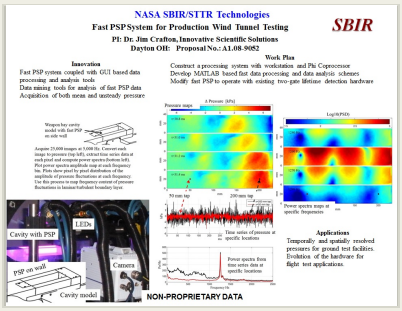
**Small Business Innovation Research/Small Business Tech Transfer**

# Fast Pressure-Sensitive Paint System for Production Wind Tunnel Testing, Phase II

Completed Technology Project (2016 - 2018)

## Project Introduction

Ground-based testing resources are essential for the development of aerospace systems. While these facilities can be expensive to maintain and operate, the cost to acquire data can be significantly reduced by implementing measurement systems featuring high data capture per test while requiring limited modification or instrumentation of models. There has recently been a significant upturn in the use of fast responding Pressure-Sensitive Paint (PSP) technology. Fast PSP, which offers a means of acquiring unsteady pressure data at millions of locations on a model surface, has long been viewed as a disruptive technology. Recent advancements in fast CMOS camera and LED technology have facilitated the realization of this long promised capability. Data at an individual pixel can be extracted and processed as traditional pressure tap data to identify mean, rms, and spectral content and full data sets can be decomposed spectrally to present the amplitude of the pressure fluctuations spatially at a series of frequencies. Acquisition of the data is only one portion of an effective fast PSP system. Fast PSP systems generate thousands of images in seconds, and each of these images represents a sample of up to one million fast pressure sensors. For maximum productivity, the data must be collected, processed, and a preliminary analysis conducted in near real-time to allow users to identify flow features of interest, and modify the test plan to maximize tunnel test time. The data processing tools must include fast processing of the data and automated analysis tools to identify key flow features in near real-time. The objective of the Phase I and Phase II program is to both identify the fast PSP hardware for a large wind tunnel system, and develop and integrate the data processing tools that will result in a productive system. The proposed fast PSP system would improve wind tunnel utilization, enhance the performance of ground-based programs, and indirectly lower operational costs




Fast Pressure-Sensitive Paint System for Production Wind Tunnel Testing, Phase II

## Table of Contents

# Fast Pressure-Sensitive Paint System for Production Wind Tunnel Testing, Phase II

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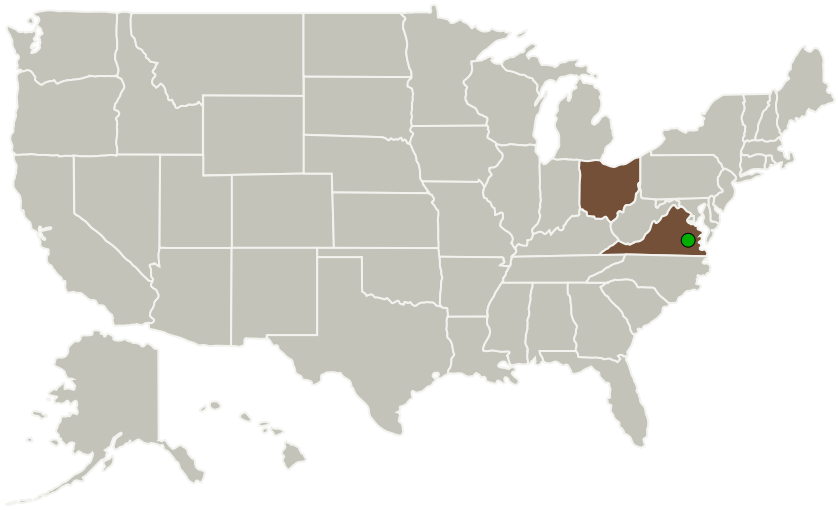
## Primary U.S. Work Locations and Key Partners



| Organizations Performing Work | Role | Type | Location |
|---|---|---|---|
| Innovative Scientific Solutions, Inc. | Lead Organization | Industry | Dayton, Ohio |
| Langley Research Center(LaRC) | Supporting Organization | NASA Center | Hampton, Virginia |

| Primary U.S. Work Locations | |
|---|---|
| Ohio | Virginia |

## Project Transitions

**April 2016:** Project Start

**September 2018:** Closed out

**Closeout Documentation:**

- Final Summary Chart*(https://techport.nasa.gov/file/139659)*

## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Organization:**

Innovative Scientific Solutions, Inc.

**Responsible Program:**

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

Carlos Torrez

**Principal Investigator:**

Jim Crafton

**Co-Investigator:**

James Crafton

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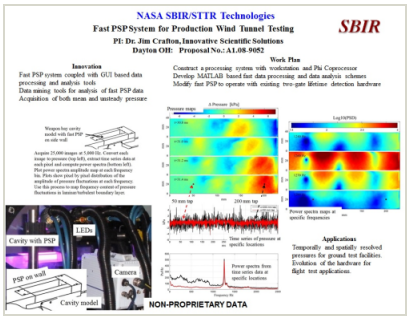
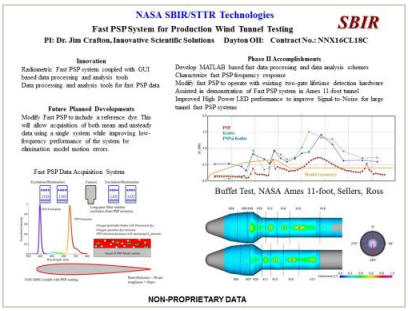
## Images



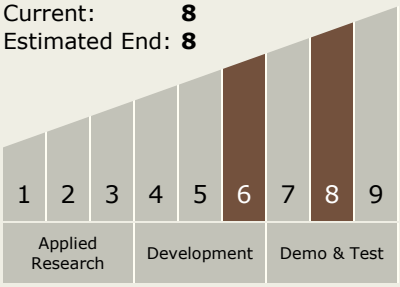

**Briefing Chart Image**
Fast Pressure-Sensitive Paint System for Production Wind Tunnel Testing, Phase II *(https://techport.nasa.gov/image/134164)*




**Final Summary Chart Image**
Fast Pressure-Sensitive Paint System for Production Wind Tunnel Testing, Phase II *(https://techport.nasa.gov/image/125731)*

## Technology Maturity (TRL)

Start: **6**
Current: **8**
Estimated End: **8**




## Technology Areas

**Primary:**

- TX08 Sensors and Instruments
  - TX08.3 In-Situ Instruments and Sensors
    - TX08.3.4 Environment Sensors

## Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System